

Sub A1

~~1. A spark plug comprising:
2 a center electrode;
3 a ground electrode opposing the center electrode in such a manner as to define
4 a spark discharge gap between the center electrode and the ground electrode; and
5 an igniter fixed to at least one of the center electrode and the ground electrode
6 in such a manner as to face the spark discharge gap, the igniter being composed of a
7 metallic material whose principal component is one of a platinum and an iridium, the
8 metallic material of the igniter comprising an oxygen content of not more than 120
9 ppm.~~

~~1 2. The spark plug as claimed in claim 1, in which the metallic material which
2 composes the igniter and whose principal component is the one of the platinum and
3 the iridium is an alloy containing a sub-component of a nickel.~~

~~1 3. The spark plug as claimed in claim 1, in which the metallic material composing
2 the igniter is at least one of a platinum-nickel alloy, a platinum-iridium alloy, a
3 platinum-iridium-nickel alloy, and an iridium-nickel alloy.~~

~~1 4. The spark plug as claimed in claim 3; in which the platinum-nickel alloy
2 contains the nickel in a range from 2% to 40% of a total mass; in which the
3 platinum-iridium alloy contains the iridium in a range from 2% to 98% of the total
4 mass; in which the platinum-iridium-nickel alloy contains the iridium in a range
5 from 2% to 40% of the total mass and contains the nickel in a range from 2% to 40%
6 of the total mass, each of the iridium and the nickel of the platinum-iridium-nickel
7 alloy being lower than the platinum in respect of a percentage content of the total
8 mass; and in which the iridium-nickel alloy contains the nickel not less than 2% of
9 the total mass.~~

~~1 5. The spark plug as claimed in claim 1, in which the spark discharge gap defined
2 between the center electrode and the ground electrode is not more than 0.6 mm.~~

1 6. The spark plug as claimed in claim 5, in which the spark discharge gap defined
2 between the center electrode and the ground electrode is in a range from 0.2 mm to
3 0.6 mm.

1 7. The spark plug as claimed in claim 1, in which the spark plug is mounted on an
2 internal combustion engine which is a gas engine.

8. A spark plug comprising:

a center electrode;

3 a ground electrode opposing the center electrode in such a manner as to define
4 a spark discharge gap between the center electrode and the ground electrode; and
5 an igniter fixed to at least one of the center electrode and the ground electrode
6 in such a manner as to face the spark discharge gap, the igniter being composed of a
7 metallic material whose principal component is one of a platinum and an iridium, the
8 metallic material of the igniter comprising a crystal grain of not less than 50 μm in a
9 mean diameter, and comprising an oxygen content of not more than 300 ppm.

1 9. The spark plug as claimed in claim 8, in which the mean diameter of the crystal
2 grain of the igniter is defined as a mean value of a maximum interval between a pair
3 of parallel lines which are tangent to an outline of the crystal grain.

1 10. The spark plug as claimed in claim 8, in which the metallic material which
2 composes the igniter and whose principal component is the one of the platinum and
3 the iridium is an alloy containing a sub-component of a nickel.

1 11. The spark plug as claimed in claim 8, in which the metallic material composing
2 the igniter is at least one of a platinum-nickel alloy, a platinum-iridium alloy, a
3 platinum-iridium-nickel alloy, and an iridium-nickel alloy.

1 12. The spark plug as claimed in claim 11; in the platinum-nickel alloy contains
2 the nickel in a range from 2% to 40% of a total mass; in which the platinum-iridium
3 alloy contains the iridium in a range from 2% to 98% of the total mass; in which the
4 platinum-iridium-nickel alloy contains the iridium in a range from 2% to 40% of the

5 total mass and contains the nickel in a range from 2% to 40% of the total mass, each
6 of the iridium and the nickel of the platinum-iridium-nickel alloy being lower than
7 the platinum in respect of a percentage content of the total mass; and in which the
8 iridium-nickel alloy contains the nickel not less than 2% of the total mass.

1 13. The spark plug as claimed in claim 8, in which the spark discharge gap defined
2 between the center electrode and the ground electrode is not more than 0.6 mm.

1 14. The spark plug as claimed in claim 13, in which the spark discharge gap
2 defined between the center electrode and the ground electrode is in a range from 0.2
3 mm to 0.6 mm.

1 15. The spark plug as claimed in claim 8, in which the spark plug is mounted on an
2 internal combustion engine which is a gas engine.

1 16. A method of producing a spark plug, the method comprising the following
2 sequential steps of:

3 carrying out a heat treatment on a metallic material chip at a heat treatment
4 temperature of not less than 800° C and not more than a melting point of the metallic
5 material chip, so that a crystal grain of the metallic material chip is not less than 50
6 μm in a mean diameter with the metallic material chip comprising an oxygen content
7 of not more than 300 ppm, the metallic material chip comprising a principal
8 component of one of a platinum and an iridium;

9 welding the metallic material chip to at least one of a center electrode and a
10 ground electrode; and

11 forming an igniter based on the metallic material chip.

1 17. The method as claimed in claim 16; in which the heat treatment of the metallic
2 material chip is carried out in one of a reduced pressure atmosphere and a hydrogen
3 atmosphere, so that the metallic material chip is recrystallized to grow the crystal
4 grain to not less than 50 μm in the mean diameter, the mean diameter of the crystal
5 grain of the metallic material chip being defined as a mean value of a maximum
6 interval between a pair of parallel lines which are tangent to an outline of the crystal

7 grain; and in which the metallic material chip comprising the platinum is subjected
8 to a resistance welding while the metallic chip comprising the iridium is subjected to
9 a laser welding.

1 18. A method of producing a spark plug, the method comprising the following
2 sequential steps of:

3 welding a metallic material chip to at least one of a center electrode and a
4 ground electrode, the metallic material chip comprising a principal component of
5 one of a platinum and an iridium;

6 carrying out a heat treatment on the metallic material chip welded to the at
7 least one of the center electrode and the ground electrode at a heat treatment
8 temperature of not less than 800° C and not more than a melting point of the metallic
9 material chip, so that a crystal grain of the metallic material chip is not less than 50
10 μm in a mean diameter with the metallic material chip comprising an oxygen content
11 of not more than 300 ppm; and

12 forming an igniter based on the metallic material chip.

1 19. The method as claimed in claim 18; in which the heat treatment of the metallic
2 material chip is carried out in one of a reduced pressure atmosphere and a hydrogen
3 atmosphere, so that the metallic material chip is recrystallized to grow the crystal
4 grain to not less than 50 μm in the mean diameter, the mean diameter of the crystal
5 grain of the metallic material chip being defined as a mean value of a maximum
6 interval between a pair of parallel lines which are tangent to an outline of the crystal
7 grain; and in which the metallic material chip comprising the platinum is subjected to
8 a resistance welding while the metallic chip comprising the iridium is subjected to
9 a laser welding.

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